A. I. BARANOV*: The species of *Corispermum* (Chenopodiaceae) in northeastern China** (1)

エイ・アイ・バラノフ*: 中国東北部の *Corispermum* (アカザ科)** (1)

Introduction and general remarks For the last 60 years the members of the genus *Corispermum* (which are called bugseeds in English) in Manchuria and adjacent parts of northeastern Asia have been repeatedly studied by Komarov, Kitagawa, Iljin, to mention only few authors, and, finally, by Skvortzov and this writer and by the Chinese botanists. This botanical work has resulted in establishing of a number of new taxa and in the better knowledge of the taxonomy of the genus as a whole. Thus, while Komarov in 1904 reported only five species of bugseeds from Manchuria and the genus was one of the least studied locally, today they are known in the aforesaid part of Asia 13 species and 10 varieties of these plants. In other words within 60 years the number of the species has almost tripled.

The true progress in the study of the group has been attained since the 1930's when M. Kitagawa took initiative in studying bugseeds in the southwestern Manchuria and Jehol. The account of this work has been published in the "Reports of the First Scientific Expedition to Manchoukuo" sect. 4, part 2. 1935, under the title: "*Corispermum* in Manchuria et Korea". In this paper were discussed nine species, seven varieties and one form, of which three species, six varieties and one form were newly described. In 1939 Kitagawa published a catalogue of Manchurian flora in which were listed ten species, seven varieties and one form of *Corisperma*6)7). It should be borne in mind, however, that the small number of species of *Corispermum* reported by Komarov accounts partly to the fact that he studied botanically only woodland of eastern Manchuria, while bugseeds are typical xerophytes and are centered in the arid regions of northern China and eastern Mongolia. So the real increase in the number of species is not as large. This statement

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** The author would like to thank Prof. Hiroshi Hara (TI) and N. N. Tzvelev (LE) for their help in various ways and the keepers and curators of the herbaria: Dr. J. P. M. Brennan (K) and Dr. P. Weibel (G) for providing information about types of *Corispermum* species.

is well illustrated by the fact that out of the 10 species of bugseeds listed in Kitagawa's catalogue, seven species belong to the flora of northern China and three species are credited to Mongolian flora. Among the three species of *Corisperma* established by Kitagawa in 1935, two have been described from Jehol and Inner Mongolia and one species has been described from Jehol and Liaotung Peninsula which is floristically very close to northern China.

The latest revisionary of the group is the monograph of the genus in the vol. 2 of the "Flora plantarum herbacearum Chinae boreali-orientalis". This monograph has been prepared and published in 1959 by the Institute of Forestry and Pedology of Academia Sinica. The aforesaid monograph is partly based on the papers of previous authors and partly is an original work. Three new species and five new varieties are described in this publication. Unfortunately, there are certain inaccuracies in this work and, besides, it is published in Chinese and is unavailable beyond the borders of China mainland. Therefore it practically remained unknown to the international botanical circles.

This prompted me to prepare this brief critical revision of Manchurian species of *Corispermum*. In the preparation of this paper I have made free use of every available source of information. I have referred to many bibliographic sources and on the first place to the previously mentioned monograph of the genus. I incorporated in this article the results of a study of a small collection of *Corispermum* fruits from Harbin, Manchuria, gathered in 1961 by B. V. Skvortzov; the figures of *Corispermum retortum, C. macrocarpum* and *C. elongatum* were made on the basis of this fruit material. Through the courtesy of Dr. H. Hara, Curator of the Herbarium of University of Tokyo I had chance to examine the fruit material of the type specimens of *Corispermum stenolepis, C. thelelegium* and *C. platypterum*. This enabled me to add new details to the descriptions of these species established in 1935 by M. Kitagawa and to provide the figures of the fruits and bracts of these species.

The genus *Corispermum* is usually thought to be the one of the most difficult for taxonomic study. The members of this genus are commonly distinguished by the differences in the inflorescence, bract and fruit gross morphology, these characters being developed clearly only in the plants with completely ripened fruits.

Taxonomically the genus *Corispermum* L. is classed under the family Chenopodiaceae Less, under the subfamily 4. Corispermoideae Ulbrich and under the Tribus 7. Corispermoideae-Corispermeae Moq. In this tribe, besides *Corispermum* L., are placed the genera *Agriophyllum* M. B. and *Anthochlamys* Fenzl[15] which are thus the most closely related groups of plants. According to the Flora URSS[4] the aforesaid three genera are classed under the Tribus 7. Corispermeae Moq., under the subfamily Cyclolobeae C. A. M., and under the family Chenopodiaceae Less. So the difference between these two systems is only on the level of subfamily. About 50 species belong to the genus *Corispermum* L. They occur mostly in the southern Europe and central and western Asia, and only one species is found in North America[15]. So the genus on the whole is confined to the Mediterranean region and its eastern prolongation.

In this paper the emphasis is made on the description of fruits of *Corispermum* species. A fruit of a bugseed is a strongly flattened structure and has in the center a small nutlet with indurated pericarp. The nutlet has on the top a two-cleft beak variously developed and formed by the remnants of two stigmata. At the margins the nutlet is surrounded by a marginal wing which may assume various form. A key to the species and brief descriptions of 13 species and 12 infraspecific taxa of Manchurian bugseeds are provided in this paper. In the key the aim has been to point out, as far as possible, that the fruit characters alone provide sufficient clues for identification of species. This idea seems to be new and its correctness, therefore, must be verified on the more abundant herbarium material than the one that I had at the time of preparation of this paper. Regarding infraspecific categories it is necessary to say that these were recognized by previous authors mostly as varieties. However, there are sound reasons to think that they are merely forms. Therefore I maintain them as forms in this paper. The paper is illustrated by the plate of figures and by the photographs of the type material of some of the species of bugseeds.

Key to the species

1. Fruits dark somber-brown, usually unicolorous, glabrous, sometimes marked with spots, but never marked with warts. Marginal wing broad, strongly undulate.. 1. *C. retortum*

1. 1. Fruits straw-yellow, reddish-brown, green or somber-brown, sometimes

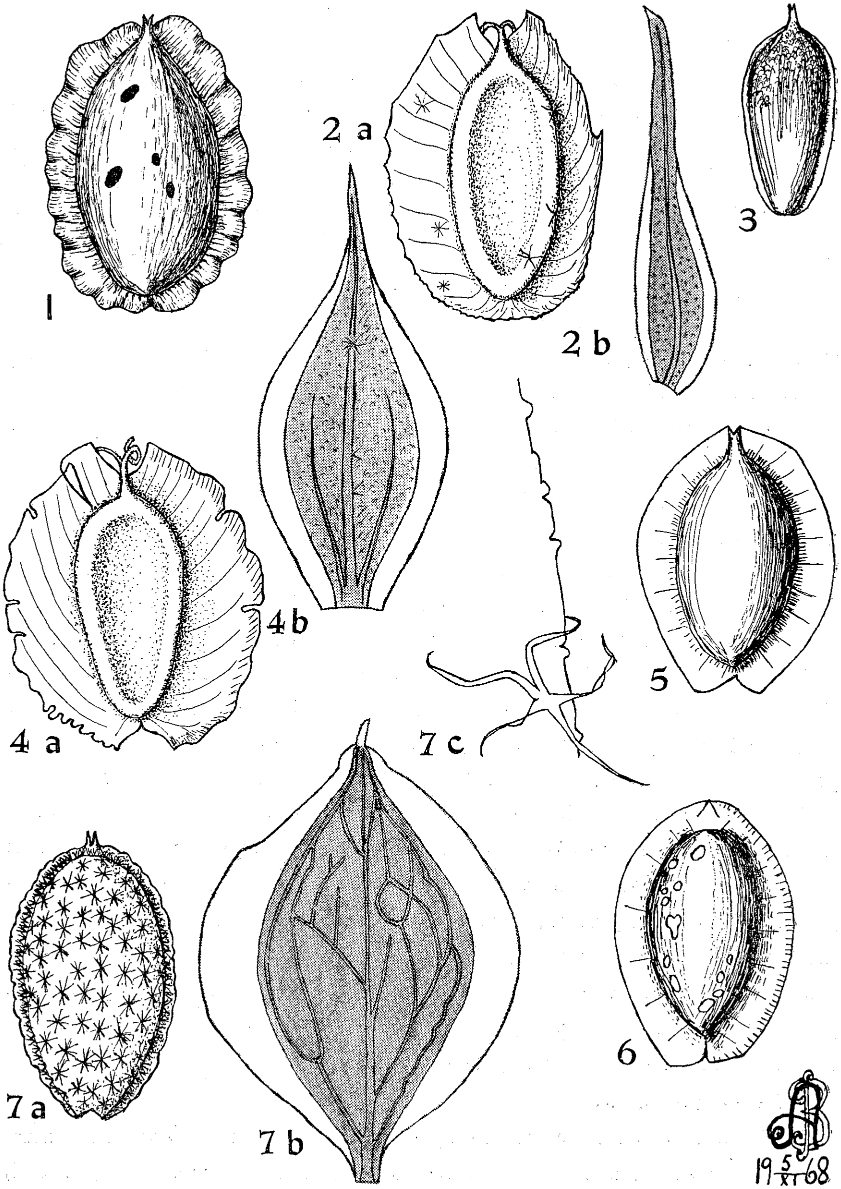

Fig. 1. Semidiagrammatic figures of fruits and bracts of *Corispermum* species. (1–7a, b.×ca. 6; 7c.×ca. 36) 1. *C. retortum*, fr. 3. *C. stenolepis*, a. fr., b. br. 3. *C. rostratum*, fr. 4. *C. platypterum*, a. fr., b. br. 5. *C. macrocarpum*, fr. 6. *C. elongatum*, fr. 7. *C. thelelegium*, a. fr., b. br., c. edge of the bract margin, very greatly enlarged. 3. redrawn from the "Flora plant. herbac. Chinae boreali-orientalis" and the rest of the figures original.

marked with dark spots or warts, glabrous or hairy. Marginal wing broad or narrow or even lacking, flat.

2. Fruits ± densely hairy.

3. Fruits sparingly hairy.

4. Marginal wing broad or very broad.

5. Fruits oblong-elliptic, straw-yellow, not warty, hairy mostly along the nutlet margin (hairs yellowish). Nutlet hollowed on the dorsal face. Marginal wing almost as broad as the nutlet, semi-transparent, along the margin irregularly erose-denticulate .... 2. *C. stenolepis*

5.5. Fruits elliptic or suborbiculate, yellowish-green or reddish, sparsely hairy, with colorless, sometimes slightly brownish, hairs; nutlet on the dorsal face not hollowed. Marginal wing membranous, 1/2-1/6 as broad as the nutlet, entire or denticulate along the margin 12......................*C. puberulum*

4.4. Marginal wing very narrow or completely lacking. Fruits narrow, oblong-obovate, yellowish-somber-brown, warty and white stellate-hairy; nutlet on the dorsal face not hollowed. Marginal wing, if present, 1/5-1/10 as broad as the nutlet, entire. .... 3. *C. rostratum*

3.3. Fruits densely hairy.

4. Fruits dark somber-brown, not shining, marked with whitish warts and covered with dense, yellowish, stellate hairs. Marginal wing very narrow, ca. 1/10 as broad as the nutlet, submembranous, semi-transparent, almost entire or slightly crenulate along the margin.. 10. *C. thelelegium*

4.4. Fruits of unknown color, neither marked with spots nor warty, on both faces densely stellate hairy. Marginal wing narrow, ca. 1/3-1/6 as broad as the nutlet, entire or obscurely denticulate along the margin............................. 13. *C. flexuosum*

2.2. Fruits glabrous.

3. Marginal wing very narrow or lacking.

4. Fruits unicolorous, not marked with spots, olive-green, neither shining nor warty. Marginal wing narrow, 1/3/1/8 as broad as the nutlet, sometimes purple colored, non-transparent, rarely com-

pletely lacking................................ 4. *C. declinatum*

4.4. Fruits dark olive-green or glaucous-green, often marked with dark somber-brown spots, very lightly shining. Marginal wing not membranous nor transparent, very narrow, 1/7–1/8 as broad as the nutlet, or lacking......................5. *C. chinganicum*

3.3. Marginal wing mostly broad (in one case broad to narrow).

4. Marginal wing denticulate all the way along the margin, membranous.

5. Fruits broad elliptic to suborbiculate.

6. Fruits straw-yellow, smooth, slightly shining, sometimes marked with light brown spots; nutlet on the dorsal face hollowed. Marginal wing ca. 3/4 as broad as the nutlet, semi-transparent, irregularly erose-denticulate along the margin .. .. 6. *C. platypterum*

6.6. Fruits dark olive-green, shining, on the dorsal face marked with spots; nutlet on the dorsal face scarcely hollowed or non-hollowed, convex. Marginal wing ca. 1/2–3/4 as broad as the nutlet, semi-transparent, minutely denticulate along the margin............................ 7. *C. macrocarpum*

5.5. Fruits elliptic or oblong-elliptic, light grayish-green, very shining, marked with whitish warts and brownish spots. Marginal wing ca. 1/3–1/6, rarely to 1/2, as broad as the nutlet, broadest in the upper half, not transparent, denticulate...... .... 8. *C. elongatum*

4.4. Marginal wing entire, mostly non-membranous.

5. Fruits dark green, always marked with distinct, dark, spots, shining (especially marginal wing). Marginal wing very broad, ca. 2/3–4/5 as broad as the nutlet, neither membranous nor transparent.................................... 9. *C. Stauntonii*

5.5. Fruits dark green or somber-brown-olive, often marked with reddish-fuscous spots, slightly shining. Marginal wing broad to narrow, ca. 1/3–1/10 as broad as the nutlet, only at the edge almost membranous, translucent, towards center of the fruit becoming thick, leathery and non-translucent. .... 11. *C. sibiricum*

1. **C. retortum** Wang Wei et Fuh, Fl. Plant. Herbac. Chinae bor.-or. 2: 82, 110. fig. 79. 1959. Tab. nostra fig. 1.

Fruit obovate-elliptic, (3, 5) 4–5 mm. long, 2,5–3,5 mm. broad, dark somberbrown, sometimes marked with few dark spots, glabrous, shining, in the upper part sometimes red. Marginal wing broad (1/2–1/3 as broad as the nutlet), undulate*, both at the apex and at the base deeply emarginate. Beak is borne in the apical sinus of the wing and is relatively weakly developed, at the base is adnate to the wing and in the upper part is free from the latter, not protruding beyond the wing's margin; branches of the beack are short, straight, erect; the slit between the branches is ca. equal to the beak's length but not reaching nutlet's margin.

Hab.: sandy places.

Distrib.: northern Manchuria.

Described from Heilungkiang province in northern Manchuria. Holotype is extant in the Herbarium of the Institute of Forestry and Pedology of Academia Sinica, Shenyang (Mukden), China.

From other species of Manchurian *Corisperma* this species differs in dark somber-brown, usually unicolorous fruits, with broad, undulate, marginal wing. The related European species *Corispermum Marschallii* Stev. is distinguished from *C. retortum* by the olive-green and broader fruit, (3) 3,5–4,5 mm. broad, and by the flat wing which is denticulate along the margin.

2. **G. stenolepis** Kitagawa, Rep. First Sci. Exped. Manch. Sect. 4(2): 102, tab. 13. 1935; idem Lineam. Fl. Mansh. 190. 1939; Wang-Wei et al. Fl. Plant. Herbac. Chinae bor.-or. 2: 82. 1959. Tab. nostra, fig. 2 a et b; et fig. 2 in textu.

Fruit oblong-elliptic to rounded-elliptic or suborbiculate, 4,0–4,5 (5,5) mm. long, 3,0–3,5 (4,0) mm. broad, light colored, yellowish-somber-brown, not warty, very slightly shining, on both faces sparingly stellate hairy, mostly along the nutlet's margin; hairs yellowish. Nutlet hollowed on the dorsal face. Marginal wing broad (ca. 1/1 as broad as the nutlet), straw yellow, flat semi-transparent, subtruncate at the base, deeply emarginate at the apex, irregularly, minutely, erose-denticulate along the margin. Beak obscure,

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* Although in the diagnosis of species the wing is described as "twisted", the figure attached to the description clearly shows that the wing is undulate in the sense of G. H. M. Lawrence *An Introduction to Plant Taxonomy* p. 46, fig. 17b. 1960.

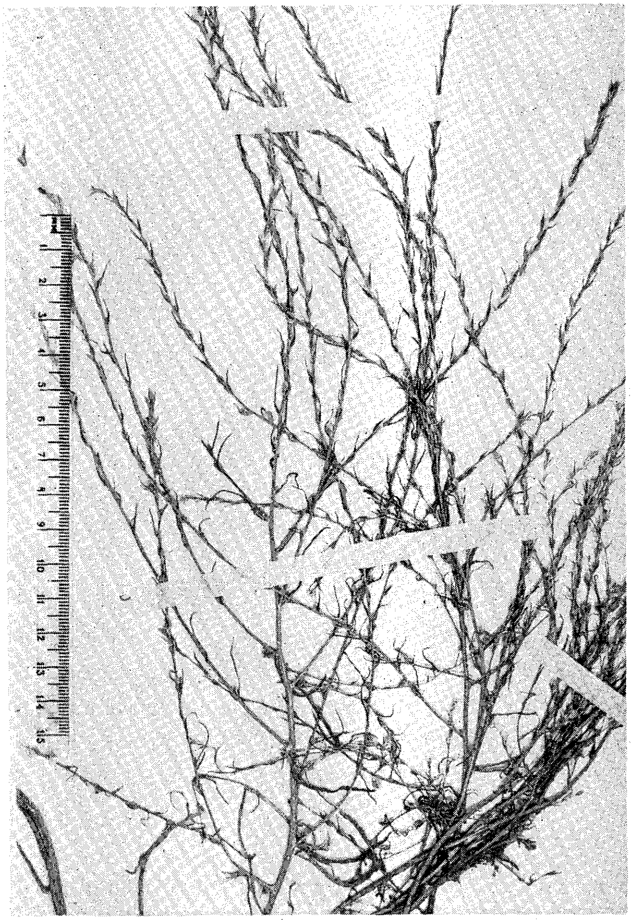

Fig. 2. Photograph of a portion of the type specimen of *Coriospemum stenolepis*. By Prof. H. Hara.

straight, ca. 1 mm. long, is borne in the apical sinus of the wing, at the base is adnate to the wing in the upper part is free from the latter, not protruding beyond the wing's margin; branches of the beak ±spreading; slit between the branches very short (ca. 1/3 as long as the beak), not reaching nutlet's margin.

Bracts very narrow ovate [lanceate], in fruit 6-7 mm. long, ca. 1,5 mm.

broad, much longer and narrower than the fruit, at base subcuneate, very long acuminate-attenuate at the apex, crowned with a sharp hyaline point, with green center and broad, white, entire margins, moderately hairy with light colored araneose hairs. Vein only one, central, thickish, yellowish, prominent near the base.

Hab.: dry meadows.

Distrib.: Manchuria. Described from Jehol province in northern China. Holotype is preserved in the Herbarium of University of Tokyo.

The members of this species with entirely glabrous fruits have been described by Kitagawa as a special variety. Since the degree of hairiness of the fruits in *Corispermum* is a rather pliable character I consider Kitagawa's variety only as a form as follows:

forma **psilocarpum** (Kitag.) A. Bar. grad. nov.

(=*C. stenolepis* var. *psilocarpum* Kitag. in Rep. First Sci. Exped. Manch. Sect. 4(2). 102, tab. 13. 1935.

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満洲およびその付近に産する *Corispermum* (カワラヒジキ・ウロコヒジキなどの類) のモノグラフである。この属はアカザ科の乾生植物で，世界に約50種知られ，地中海地方を中心とし，満洲方面はその端に当たる。著者は果実の特徴を最も重視し，これによってこの分類困難な属を整理し，この地方に13種と，12の種以下の分類群(今まで変種と考えられていたものを品種になおした) を認めた。

○ケナシヒメムカシヨモギ台湾に広布 (水島正美) Masami MIZUSHIMA: *Erigeron pusillus* Nutt., a common weed in Taiwan, China.

此の雑草については本誌42巻11-12号 (1967) に津山・浅井両氏の詳論がある。その台湾産は台北市北郊の陽明山で佐々木一郎氏が採られた標本が引用されたに過ぎない。小生は昨年十月から本年二月の同島滞留中，各地を訪れるごとに注意を払った結果，従来台湾で *Erigeron canadensis* と称されて来た種類はケナシ型で，真のヒメムカシヨモギではないことを知った。島の南北を通じて時期が遅かったので，果実が散ってしまったものが多かった。また総包片上端部の黒紫点は個体により必ずしも明顯ではないが，葉形や無毛な点を併せて見れば，ケナシヒメムカシヨモギと同定できるものばかりであった。路傍，荒地，河床など陽乾の地に普通な帰化品となっている。

(東京都立大学理学部，牧野標本館)